DOCUMENT RESUME

ED 060 911 LI 003 579

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TITLE Systems Analysis, Machineable Circulation Data and Library Users and Non-Users.
PUB DATE 71
NOTE 12p.; (36 References); Paper prepared for American Society for Engineering Education Annual Meeting (U.S. Naval Academy, Annapolis, Maryland, June 21-24, 1971)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Library Automation; *Library Circulation; Systems Analysis; *University Libraries; Use Studies

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AMERICAN SOCIETY FOR ENGINEERING EDUCATION
ANNUAL MEETING, JUNE 21 - 24, 1971

U.S. NAVAL ACADEMY
ANNAPOLIS, MARYLAND 21402

SYSTEMS ANALYSIS, MACHINEABLE CIRCULATION DATA AND LIBRARY USERS AND NON-USERS

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Abstract

A study to be made with computer-based circulation data of the non-use and use of a large academic library is discussed. A search of the literature reveals that computer-based circulation systems can be, but have not been, utilized to provide data bases for systematic analyses of library users and resources. The data gathered in the circulation system will be of particular value in two areas: identifying the non-users of a library and the areas of non-use and testing and demonstrating the use of computer-based circulation data files as the data base for studies that would improve services and provide decision making aids. The study methodology would involve the comparisons of the circulation transaction files and the borrower address files to produce two areas of investigation, use and non-use. A variety of information would be gathered about each group.

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LIBRARY USERS AND NON-USERS

Through the logic of systems analysis and the view of the circulation system and its data as part of the total library system it should be clear that many important studies of library use and non-use and library effectiveness could be made.

Computer-based circulation systems, it is widely believed, can be utilized to provide data bases for such studies. The study described in this paper would involve using such a data base to analyze use and non-use of a large academic library. While it is recognized that non-use in engineering schools exists to a large extent because of an individual's lack of a need to use the library (see item 22 in the bibliography), little is known about groups of non-users.

Another major objective of this research would be the testing of machine-readable circulation data serving as the resource for a variety of computer-based studies. The investigation would examine through application the qualitative and economic questions involved in doing such a study. This would be of value to the other libraries that have computer-based circulation systems and may be contemplating using the circulation data as a source of information for better decision making in, for example, such areas as collection development and book budget allocation. The research should demonstrate the usefulness of computer-based circulation data as part of the total library system.

In addition to the discovery of who the non-users of the library may be, it is of great importance to know who the users are. This information can be helpful in such matters as the development of library use instruction for particular disciplines and for justifying book budget decisions.

A literature search reveals that the design of computer-based systems has not gone beyond an emulation of the manual system. Invariably a sentence or two about user and other studies now made possible (Gull, Hayes, Surace) is provided in discussions of mechanized circulation, but few have made any application of these concepts.

The recent book by Hayes and Becker, Handbook of Data Processing for Libraries, devotes over sixty pages (pp. 481-547) to automated circulation systems. The data elements of such systems are described but no mention is made of the research opportunities with such data. The book does touch upon some of the new uses to which computerized data can be put (p. 172). The example given is the measurement of the frequency of use of each book by its call number.

Historically, Becker has pointed out that mechanized circulation control began in the 1930's, when edge-notched cards were used. When punched cards were introduced (Parker) in place of the edge-notched variety, circulation systems were able to use card sorters to help maintain the circulation files.

The concept of a machine-readable book card and borrower's card was introduced in the 1940's by IBM, when it designed such an installation for the Montclair Public Library (Quigley). This system required that a punched book card and borrower's card be inserted in a "record control unit" which would, via another keypunch, reproduce the inserted information. Quigley noted in 1941 the numerous by-products with such equipment:

> It is perfectly possible, for instance,...to learn by sorting the cards what books the doctors among the Library borrowers had read ...how many detective stories were borrowed during a certain time, what non-fiction had been borrowed by boys of a stated age.... The possibilities of obtaining information on 'who reads what' are so unlimited that Montclair librarians will probably need to guard against seeking curious bits of information or riding professional hobbies.

In 1959 IBM produced the 357 Data Collection System for circulation control. The output of this system was fed into the computer and a magnetic tape produced for computer processing. Since the early 1960's a number of other systems have been introduced, including Bro Dart's KomPunch, Standard Register's Source Record Punch, Colorado Instruments C-Dek System, and a number of other commercial data collecting devices.

Mid-western University and the Illinois State Library have progressed to on-line circulation systems (Heineke and Hamilton, respectively).

Most of the literature describes the installation phases of mechanized circulation systems. Economic justifications, systems analysis, and other aspects of how and why the change-over from manual to machine techniques was made are discussed. Little attention is paid to the use of this information as an aid for administrative or service decision-making.

The important study by Cammack describes data that can be collected and analyzed to assist library management. The data include charging activity patterns to assist in manpower scheduling, heaviest used portion of the collection, student and faculty usage; students and fields of study correlations, grades and library usage, etc. This study is a fine example of what can be done with circulation data.

DeGennaro, in his article on Harvard University's Widener Library shelf list conversion program, states that records of circulation data at Harvard have been kept since 1965 and these "constitute an invaluable and unique data base from which statistical analyses of the use of the collection have been made". The study referred to (Palmer) is an analysis by Harvard book classification number of the use of books during 1965-69. DeGennaro goes on to say that "such potentially useful management information has never before been available to library administrators".

The University of British Columbia's computerized circulation system has been utilized to study some patterns of use. J. McNee Elrod (in his letter on

p. 145 of Coll. and Res. Lib. March, 1971) says that "Perhaps the most important result of computerized circulation has been the ease with which months of loan records can now be analyzed...with the demand for each book measured ...the library could do a much more efficient job of meeting readers' needs. The figures will indicate when a reserve book should be taken off short-term loan and when a stack book should be put on reserve or duplicated".

Writing in 1967, C. D. Gull, Professor Library Science at Indiana University stated: "There is a very real need for information about the present capabilities and future potentialities of computerized circulation control systems...there is almost no information on the effective use of library materials and the need for them, on the potential application of computers for circulation statistics, on the introduction of rational management to supplant intuitive management or on the use of circulation information to improve collections and service" (letter on p. 903 of ALA Bulletin, September, 1967).

Since the time of Gull's call for research in this area, more sophisticated systems have been developed (at least three on-line circulation systems have become operational) and more attention has been paid to cost/benefit analysis. But as of the date of this study Gull's call for research has barely begun to be answered. This is unusual, because circulation data have been analyzed frequently in the past in manual systems (Davidson, Jain, Steig). These analyses were usually accomplished through the laborious method of tabulating the information on each book's circulation card and/or date-due slip. That these manual techniques have not been adapted to mechanization may be explained by the systems designers disenchantment with such basic research, or that they are bogged down more with just making the hardware work than with innovating and improving library services.

A state-of-the art report by Cecily Surace of the Rand Corporation, published in March, 1970, commented: "Since the principal purpose of the library is to disseminate information found in documents and one of the instruments for doing this is the circulation system, it is obvious the circulation system should not be treated as a purely mechanical operation which does not require statistical analysis and feed-back.... It can...assist management in analyzing the various circulation operations, reveal weakness in the collection, and provide data on user reading habits, etc.".

Non-use of libraries has only been studied (except for item 22 in the Bibliography) as incidental to the study of use (Barkey, Clayton, Lane). Tentative findings (Knight) indicate that as high as 60 percent of the student academic population does not check out books. This is, of course, not an exact measure of non-use, since as high as 50 percent of a sample of students use the library only to study.

Lubans' work (1970) in the area of non-use has revealed that use of the library at a technological university by a selected sample was essentially related to course work. Non-use is based upon the individual student's need-to-

know as prescribed by his curriculum. In an earlier study (1969) it was discovered that students use the library in some relation to their class standing (grade point average) and that as a student goes through school his use of the library increases.

The following chart, "Overview of Circulation System", describes how most computer-based circulation systems are designed to work. For every circulation transaction (or book loaned) the book's call number and the borrower's ID number are combined. With this information a variety of computer studies are possible. It is possible to find out what books (by subject) circulate and by elimination what books are not borrowed, who are users and non-users, and what departments or areas of study make the greater or lesser use of the library. As a more specific example, if very few books about Icelandic literature are being borrowed, and if after investigation it turns out that the university is no longer interested in this subject, it can be assumed that research-level materials in this one area need no longer be purchased. The many possible studies through computer-based circulation records are delineated in the table, "Possible Studies With Machineable Circulation Data Files".

The method of this study would involve the comparison (D) of the circulation transaction files (B) and the borrower address files (C) to produce two areas: use and non-use. (The narrative of this section is coded by letters to the flow chart "Overview of Circulation Data Study"). This is possible by the machine listing identification numbers that have been used to charge out books and preparing a separate list of those ID numbers that have not been used to charge out materials. At the same time a printout (E) would be made of the major items on these files, e.g. the totals and percentages of non-use and use, the total number and percentages of books borrowed by classification numbers and by Departments by classification numbers and the total number and percentages of books borrowed according to the academic status level of the user (freshman to faculty). These reports would be analyzed for additional significant findings (F). Previous to this analysis a profile (A) for each department would be introduced into the computer for reference. This profile would include the department's number of faculty, students, the hours taught, and any other possibly useful information.

The "use" file (G) of ID numbers and books charged out while still on tape would be surveyed to produce a stratified sample of users by departments or major (H) along with the profile information for each department. This sample then would be the source list for interviews either in person or through the mail (I). After the questionnaires are returned they will be tabulated (J) and a printout produced (K). A further step would be the comparison (L) of the users' response to the questionnaire (identical for users and non-users) with the reactions of the non-users to the same questionnaire.

In a similar manner the non-use file (N) would be surveyed for a sample by department or major (O) of non-users to be interviewed either in person or by mail questionnaire (P). After tabulating the response to the questionnaires by non-users (Q) and producing a printout of the results, this information would be

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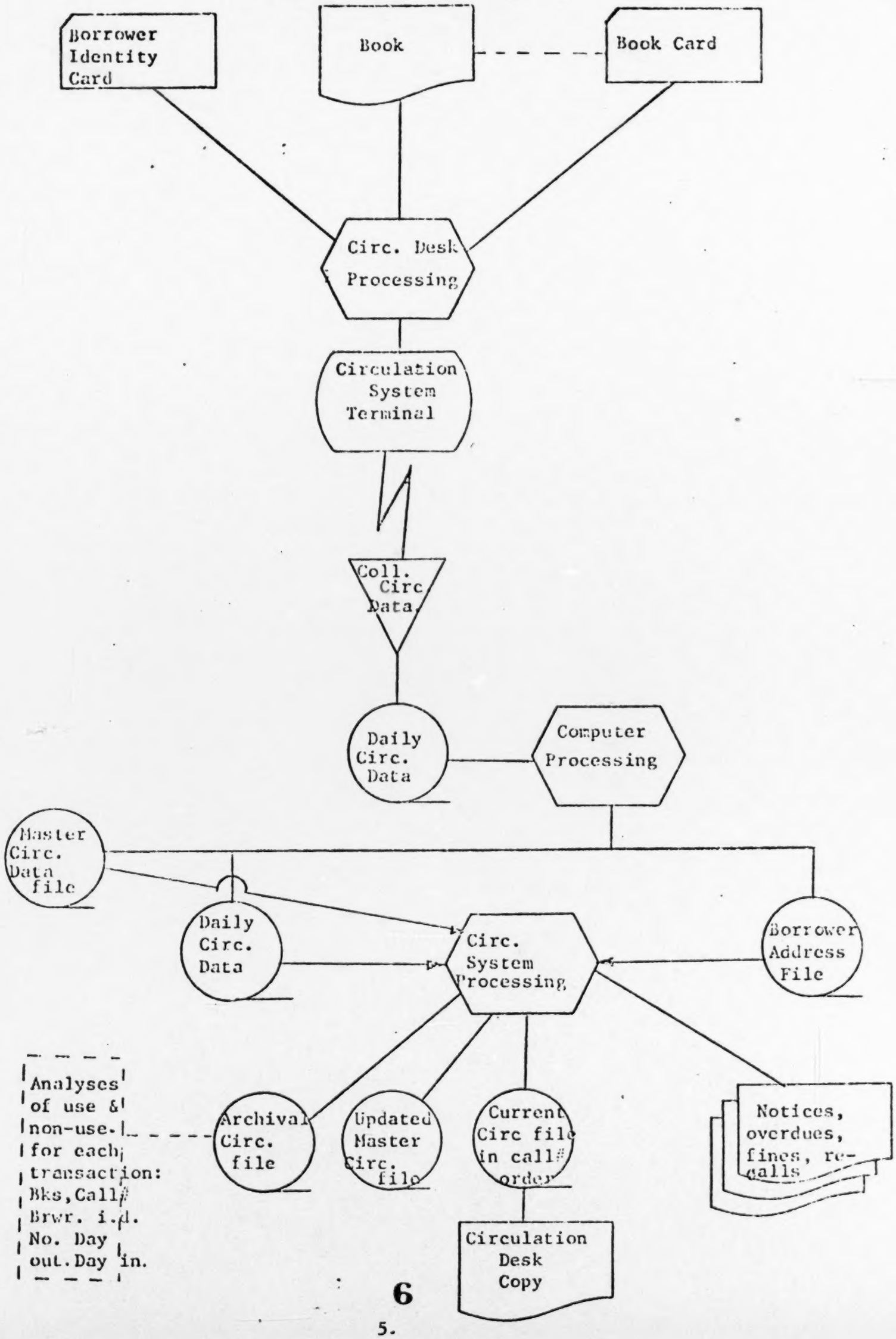
OVERVIEW OF CIRCULATION SYSTEM



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POSSIBLE STUDIES WITH MACHINEABLE CIRCULATION DATA FILES

Data elements in available files	Volume of Circulation (by subject)	Work loads by hour, session	Subject use of books	User affiliation (by Dept.)	Collection evaluation by use & non-use	Non-users and users	Fines - overdues	Inventories	Circulation of books by type of purchase	Predictio of future use
Book's call number	X		X	X	X	X		X	X	X
User's status: FROSH				X	X	X				
SOPH				X	X	X				X
JR.				X	X	X				X
SR.				X	X	X				X
5th Yr.				X	X	X				X
GR				X	X	X				X
FAC				X	X	X				X
STAFF				X	X	X				X
Dept/Major of User				X	X	X				X
Registration data (e.g QPA of users) student number				X	X	X				X
Date & Hour of transaction discharge - charge	X	X	X				X			X
Charge-out record for each book (cumulative)	X		X	X	X	X	X			X
Overdue notices issued							X			
Financial (fines) information							X			
Holds placed on a book							X			
Other computer based records										
Order dep't.									X	
Other CU records				X	X	X			X	

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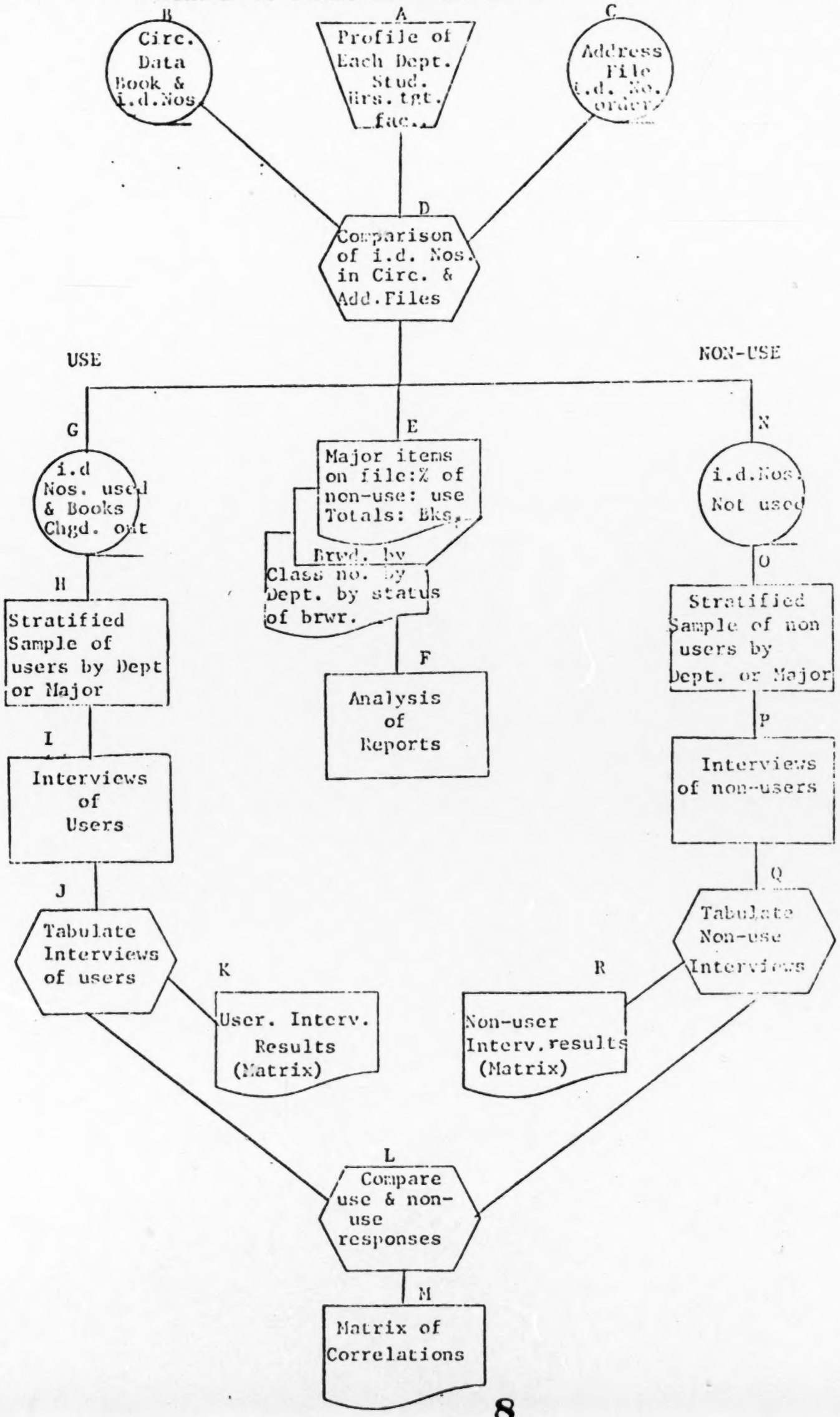
OVERVIEW OF CIRCULATION DATA STUDY



compared to results of the user survey (L). A matrix of the results of the comparison and its correlations would be produced for analysis (M). The results produced for analysis would include among others the following comparisons between users and non-users: patterns of information seeking and finding, the various information requirements of each group subdivided by discipline, and the relationships of library use/non-use based on certain characteristics of the sampled individuals. The analysis would deal with the similarities and the unique features of each group.

The questionnaire would be constructed to elicit reaction to statements that would measure the respondent's appreciation of the value of library-use knowledge, his impressions of libraries and librarians, his pattern of seeking and finding information, his success or failure in this regard, his informational needs, etc. These findings, in addition to the data supplied by the computer will help to produce profiles of users and non-users and their problems. The analysis of this data should turn up some possible solutions to increasing use and decreasing non-use.

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